

WHAT IS CLAIMED IS:

1 1. A temperature controlled case for storage and display of chilled or
2 frozen products comprising at least one compartment for product storage, at least one
3 access opening providing entrance to the compartment, at least one shelf within the
4 compartment configured for holding the products, at least one cooling device above
5 the shelf, a refrigeration system operatively associated with the compartment and
6 configured to circulate a cooling medium through separate coolant supply and
7 discharge lines to at least one of the cooling device and the shelf so that a desired
8 temperature may be maintained within the compartment for storage of the products,
9 and a defrost system configured to use ambient air to warm the cooling medium so
10 that the warmed cooling medium may be circulated to defrost at least one of the
11 cooling device and the shelf.

1 2. The temperature controlled case of Claim 1 wherein the shelf is
2 divided into separate sections.

1 3. The temperature controlled case of Claim 1 wherein the defrost system
2 includes at least one valve configured to direct the flow of the warmed fluid to at least
3 one of the cooling device and the shelf during a defrost mode of operation.

1 4. The temperature controlled case of Claim 1 wherein the refrigeration
2 system comprises a primary and secondary cooling system, where the primary cooling
3 system is configured to chill the secondary cooling system and wherein the secondary
4 cooling system is configured to provide the cooling medium to at least one of the
5 cooling device and the shelf.

1 5. The temperature controlled case of Claim 4 wherein the cooling
2 medium is a liquid secondary coolant configured to flow through the cooling device
3 and the shelf.

1 6. The temperature controlled case of Claim 1 further comprising a louver
2 device adjacent and beneath the cooling device and a drain extending from the louver
3 device.

1 7. The temperature controlled case of Claim 6 wherein the louver device
2 includes lighting.

1 8. The temperature controlled case of Claim 4 further comprising a chiller
2 interconnected to the primary cooling system and the secondary cooling system.

1 9. The temperature controlled case of Claim 2 including a coolant liquid
2 inlet header connected to the shelf and a coolant liquid outlet header connected to the
3 shelf.

1 10. The temperature controlled case of Claim 9 further comprising
2 connectors for connecting and disconnecting each shelf section to the headers.

1 11. The temperature controlled case of Claim 1 further comprising a first
2 flow regulator configured for supplying the cooling medium to the cooling device and
3 a second flow regulator configured for supplying the cooling medium to the shelf.

1 12. The temperature controlled case of Claim 11 including a chilled liquid
2 supply header connected to the flow regulators.

1 13. The temperature controlled case of Claim 3 wherein the defrost system
2 includes a heat exchanger and a fan operative to use warm air from a store
3 environment to warm the cooling medium.

1 14. The temperature controlled case of Claim 1 wherein the defrost system
2 comprises a fan and a coil configured to warm the cooling medium with air from a
3 store environment.

1 15. A refrigeration device having a primary cooling system with a primary
2 fluid communicating with a first heat exchanger and a secondary cooling system with
3 a secondary fluid communicating with the first heat exchanger to cool the secondary
4 fluid and communicating with at least one cooling device configured to provide
5 cooling to a compartment to be cooled in a first mode of operation, the refrigeration
6 device comprising:

7 at least one coolant supply line and at least one coolant discharge line
8 configured to circulate the secondary fluid through the at least one cooling device;
9 and

10 a second heat exchanger communicating with the secondary cooling system
11 and communicating with a source of ambient air to warm the secondary fluid in a
12 second mode of operation.

1 16. The refrigeration device of Claim 15 wherein the first mode of
2 operation is a refrigeration mode and the second mode of operation is a defrost mode.

1 17. The refrigeration device of Claim 16 wherein the at least one cooling
2 device comprises a shelf configured to support objects to be cooled within the
3 compartment.

1 18. The refrigeration device of Claim 17 wherein the shelf is divided into
2 separate sections.

1 19. The refrigeration device of Claim 17 wherein the at least one cooling
2 device further comprises a cooling coil disposed above the shelf and the objects
3 within the compartment.

1 20. The refrigeration device of Claim 19 wherein the shelf is configured to
2 operate in the refrigeration mode while the cooling coil is configured to operate in the
3 defrost mode.

1 21. The refrigeration device of Claim 19 wherein a frequency of operation
2 of the cooling coil in the defrost mode is greater than a frequency of operation of the
3 shelf in the defrost mode.

1 22. The refrigeration device of Claim 19 further comprising a louver
2 beneath the cooling coil, wherein the louver is configured to direct air flow through
3 the compartment.

1 23. The refrigeration device of Claim 15 wherein the source of ambient air
2 is an air space in a store.

1 24. The refrigeration device of Claim 15 wherein the at least one cooling
2 device comprises a shelf having channels for circulating coolant through the shelf to
3 provide contact cooling to objects supported in the shelf.

1 25. The refrigeration device of Claim 24 wherein the shelf further
2 comprises an insulation layer on an underside of the shelf.

1 26. A system for refrigeration of products comprising:
2 a case having a compartment defining a space configured to receive the
3 products;
4 a first heat exchanger configured to cool a fluid communicating with the space
5 to cool the objects;
6 a second heat exchanger configured to receive a heat supply from an air source
7 to warm the fluid; and
8 at least one coolant supply line and at least one coolant discharge line
9 configured to direct the fluid in communication with the space.

1 27. The system of Claim 26 wherein the air source is an ambient air source
2 in a store.

1 28. The system of Claim 26 wherein the cooled fluid is circulated to at
2 least one cooling device communicating with the space during a refrigeration mode of
3 operation and the warmed fluid is circulated to the at least one cooling device during a
4 defrost mode of operation.

1 29. The system of Claim 28 wherein the at least one cooling device
2 comprises a shelf disposed in the compartment and a cooling coil disposed above the
3 products.

1 30. The system of Claim 29 wherein a frequency of the defrost mode of
2 operation for the cooling coil is greater than a frequency of the defrost mode of
3 operation for the shelf.

1 31. The system of Claim 28 wherein a first cooling device is configured to
2 operate in the refrigeration mode of operation while a second cooling device is
3 configured to operate in the defrost mode of operation.

1 32. The system of Claim 29 further comprising at least one flow regulating
2 device configured to control the flow of the fluid to at least one of the cooling coil and
3 the shelf.

1 33. The system of Claim 32 wherein fluid is circulated to the cooling coil
2 at a first flow rate and the fluid is circulated to the shelf at a second flow rate different
3 from the first flow rate.

1 34. The system of Claim 32 wherein the cooling coil is maintained at a
2 first temperature and the shelf is maintained at a second temperature different from
3 the first flow rate.

1 35. The system of Claim 26 wherein the second heat exchanger is a fan-
2 coil unit.

1 36. The system of Claim 26 further comprising a louver assembly
2 configured to direct a flow of air within the space.